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Journal of the Society of Arts.

FRIDAY, JANUARY 4, 1856.

MEETING OF COUNCIL.

WEDNESDAY, JANUARY 2, 1856.

The following Institution has been taken into Union since the last announcement:—

407. Caistor, Mechanics' Institute.

NOTICE TO INSTITUTIONS.

A meeting of representatives from Institutions in the neighbourhood, or within easy access of London, has been fixed to be held at the Society's House, John-street, Adelphi, on Friday, the 18th of January instant, at 6 P.M., to confer with the Council on the best means to be adopted for practically giving effect to the Society's scheme for the examination of members of classes, for the promoting of the formation of classes, and to discuss whether any and what steps are desirable to be taken in reference to lectures. In inviting to this meeting a section only of the Institutions, the Council has had in view simply their convenience, and with no desire to exclude any; on the contrary, the Council will be glad to have the attendance of representatives from any Institution in Union, whether near or distant.

The Institutions proposing to send representatives to this meeting, are requested to forward to the Secretary of the Society of Arts, a few days previous to the meeting, the names of those who will attend on their behalf. It is to be understood that this meeting is not to be considered as a formal conference, but simply in the light of a committee meeting.

ON THE METHODS NOW ADOPTED FOR PRESERVING MUSEUM SPECIMENS OF FISH.

The Jamaica Society of Arts having made inquiries as to the methods now adopted for preserving museum specimens of fish, and also the cost of the necessary vessels for that purpose, the information in the subjoined report has been obtained and sent out, and is now printed, as it may be of use to other Societies and individuals both at home and abroad.

REPORT.

Professor Owen, of the Royal College of Surgeons, gives the result of experiments made by him on the best medium for preserving fishes, and says, "The medium is glycerine, now to be had at a more reasonable rate than usual at Price's Patent Candle Manufactory, Belmont, Vauxhall. There needs no other trouble than to immerse the fish as soon as caught in a keg or wide-mouthed stoppered bottle of the glycerine. For colonial collections, a well-made keg would be the best; a number to be attached to each fish corresponding to a list, giving the locality, date of capture, and name of fish, if known."

Dr. Gray, of the British Museum, says, "for some purposes I prefer dry, and for others fish preserved in spirits. I

therefore always pack a specimen of each kind each way. For general purposes the skin of one side of the fish and fins attached is sufficient. They are dried, nailed to a board, with sufficient quantity of tow or cotton beneath to give the proper convexity, and when dry, varnished. For wet preparations there is nothing like spirits. Rum and gin are good, as the sugar they contain assists the process. The fish should have one or more incisions made in one of its sides, to admit the spirit into the interior, to prevent the viscera from rotting. If they are to travel, each specimen should be wrapped round with tow or calico, or other wrapping, to prevent their rubbing against each other and thus spoil, and the vacant space in the vessel filled with cotton or some other light material. The best bottles for exhibition are the cylindrical jars, which I introduced here, without any contraction at the throat, as they require less spirits. Ours are made by Powell, of Whitefriars, who would supply particulars and prices."

Mr. G. F. Wilson, Managing Director of Price's Patent Candle Company, "expects that the best degree of concentration will prove to be one part glycerine and two parts water." He states that "perch and roach immersed in glycerine four months ago have now their colours unchanged."

Messrs. Powell and Sons, of Whitefriars, speaking of the bottles, say, "They are generally sold by weight, and we give the following prices for 'Tie-over Rounds on feet,' (the trade name for vessels of this kind, the mouths of which are to be closed with bladder or other material, instead of stoppers):—

Inches.	Inches.	lbs. ozs.
14 by 6½	Weighing about, each	4 12 at 1s. 4d. per lb.
15 by 5	" each	3 0 at 1s. 2½.
13 by 3	" each	1 5 at 1s. 2d. "
8½ by 3½	" each	1 0 at 1s. 2d. "
14 by 5	" each	3 4 at 1s. 2d. "

Cutting the bottoms adds 2d. a piece extra to the cost."

They say "we can make some larger, say from 12 to 30 inches high, not 36; these will be about from 6 to 10 inches diameter. We cannot make them larger in diameter, that height; we can make them 12 inches in diameter, but they will not be more than from 20 to 24 inches high; the prices of these large ones vary according to sizes and the quantity ordered, say from 1s. 6d. to 2s. per lb.

"We also supply for specimens stoppered rounds, of which the following are a few of the prices:—

In.	In.	In.	In.
12 by 6, no feet, at 10s. 0d. each.	On feet, 9 by 4½, at 5s. 0d. each.		
16 by 4, " at 4s. 3d. each.	13 by 5½, at 9s. 0d. each.		
13 by 3½, " at 5s. 0d. each.	9 by 3½, at 3s. 4d. each.		
9 by 3, " at 3s. 0d. each.	6 by 2½, at 2s. 0d. each.		

"Messrs. Powell and Sons also supply oval jars, which for some specimens are more convenient than round; these vary in price from 1s. 8d. to 2s. per lb.

"The foregoing are the prices delivered on board ship, with a discount of 5 per cent. for cash."

P. LE NEVE FOSTER, Secretary.

Dec. 31, 1855.

LIMITED LIABILITY.

The members of the Society have so long taken an interest in this important question, that it is thought desirable to call attention to the legislation which took place last session of Parliament in reference to it. The principle of partnerships with limited liability is admitted by the Act (18 and 19 Vict. c., 133) which has been passed, but the conditions under which Companies can take advantage of the new law, are such as to render it doubtful how far the principle has a fair chance of being tested. Every Company, formed or to be formed, with limited liability, must be formed under the 7 and 8 Vic. c., 100, commonly known as the Joint Stock Act, the provisions of which involve such a cumbrous machinery as entirely precludes any but large companies. The expenses both of forma-

tion and management under the latter Act, would be so burdensome on small capitals as practically to exclude all small companies. Whether this be an evil or not, may be a question, but, at all events, one of the reasons on which the limited liability principle has been advocated is prevented coming into operation. Mr. Wordsworth, in a note to this Act,* raises an important doubt, which, whether well founded or not, has already had, it is said, considerable influence in preventing the Act being so largely adopted as it otherwise would have been. The doubt arises from the wording of one of the clauses of the Act. Upon certain conditions being performed, the Registrar of Joint Stock Companies grants a certificate of complete registration with limited liability. Mr. Wordsworth says, "The mere granting of the certificate by the Registrar with the word 'limited' upon it, does not in itself confer limited liability. It only operates in furtherance of the previous requirements, when they shall have been *bona-fide* satisfied. It would seem, therefore, that in the circumstances referred to, the company would not be legally formed, and an innocent shareholder joining this concern some time after its formation, might find his liability would become *un-limited* instead of limited."

FLAX AND ITS PRODUCTS IN IRELAND.

CONTRIBUTED BY WM. CHARLEY, J.P., SEYMOUR HILL, BELFAST.

LETTER XIII.

The next process we have to consider in regular rotation after grassing, is the separating of the fibre from the woody portion, or straw; this operation is technically called *scutching*.

When the Courtrai system is adopted as described in a previous paper (Letter XI.), the scutching, of course, cannot be performed till the retting and grassing are completed, probably, eight or ten months after the crop is harvested. If the agriculturist prefers to get rid of his flax at once, without the trouble of the various details which follow the pulling of the plant in the field, he will dispose of his crop in the green state to some of the owners or managers of the patent retteries of Shenck or Watt; but the ordinary, and after all not the worst system, both as to quality, produce, and profits, is to have the crop stacked for a few weeks after the grassing is completed, and during the winter months have it well scutched, tied up in bundles, and sent to market.

The scutching or cleaning of the flax was at one time effected entirely by *hand-labour*; even yet many of the small farmers employ their families, during the inclement months of the cold season, in scutching by hand in the house or barn. They value the labour, of course, very low, as the severity of the weather prevents the farm-work being prosecuted during a good many days every year, and if not employed thus, the younger branches of the family would most likely be sitting quite idle at the warm fire-side. Louis Crommelin describes his improved plan, A.D. 1705, to consist in putting the sheaf of flax on the barn-floor opening and spreading three-inches thick, taking care that the *roots* are all one way, then "clap your foot on the flax" and begin to thresh it with the mallet at the root-end first, keeping the foot always on the stems to make them steady under the blows; when the one side has undergone this operation, the bundle to be turned with the other side up, and threshed in like manner. The flax is then *broken*, and afterwards must be scutched. This is done by taking a wooden article, something like a broad knife, in the right hand, and in the left a bunch of flax; the fibre is hung through a notch in an upright board, and is struck repeatedly with the scutching blade till the straw is driven off.

* Limited Liability Act, with observations and notes by Charles Wordsworth, Esq., Barrister at Law, Counsel to and Associate of the Institution of Civil Engineers, London. W. G. Benning and Co., 43, Fleet-street, 1855.

This was the treatment by hand in Louis Crommelin's day, and as there is scarcely any change in the style of manipulation, it may be taken as a fair exposition of this particular system.

The introduction of machinery driven by steam or water-power has, in a great measure, superseded the hand-labour. Mill-scutched flax brings a higher price in the market, and the operation by machinery facilitates the prompt preparation of the fibre from the unfinished to the saleable condition.

The first trial of machinery was the construction of an axis, with *horizontal* blades attached, which worked inside a circular box, with openings in the top, through which the flax was introduced and subjected to the striking action of the blades. This machine was found rather severe on the fibre, and a modification was invented which proved quite successful.

This plan exactly followed the position of the flax when being hand-scutched, using instead of the arm of the man, a horizontal shaft, with the wooden blades attached revolving and acting on the flax vertically.

This is the system of the present scutching-mills. The process of threshing by the mallet in the hand operation, is performed now in the mills by passing the flax between a set of rollers, which bruise it so completely as to render much more easy the after-separation of the straw.

The trustees of the linen manufacture, during their jurisdiction prior to A.D. 1828, directed great attention to improvements in the scutching process, and of late years her Majesty's government have shown a similar laudable anxiety to encourage the erection of superior mills.

In many parts of England and Ireland the want of flax-cleaning machinery convenient to the farmsteads is very much felt. The scutching is always rather an expensive operation, even in the north of Ireland, and in remote districts, where heavy carriage is required to a distant mill, the agriculturist is often much embarrassed. All large proprietors, or, where there are not such, the local Farming Associations, ought certainly to see that every district capable of growing flax is provided with a good mill.

The Land Improvement Acts give power to the Commissioners of Public Works to lend money on favourable terms to needy proprietors for the erection of scutch mills in Ireland, so that our landlords have no excuse whatever for not providing their tenants with this important accommodation.

The estimated expense of the building, for containing about 12 stands for scutching, as sanctioned by the office of Public Works, under Act 15 and 16 Vic., cap. 34, is £88 18s. Od., or in two stories, £95 6s. Od. To this must be added the cost of the machinery, say a small water-wheel and gearing, with the shaft and blades attached, stocks and adjoining woodwork, and a set of rollers. The amount will vary very much, according to circumstances, and in proportion to the number of stands erected. A small mill with four stands would cost for this machinery about £60, while one with 12 stands would amount to £150. To these sums must be added the expense of the building, so that the relative costs would be approximately

Small mill, complete	£104
Large do. do.	238.

The size of a mill is, of course, or at least ought to be, regulated by the probable wants of the flax-growers in the immediate neighbourhood. The expensive carriage from distant farms is objectionable, and certainly unprofitable.

An improvement lately introduced, and found of much service, is the adoption of stocks so arranged as to *spring* in the operation of scutching, and thus prevent the flax from being injured by too severe action from the blades.

By these spring-stocks, combined with flat, projecting spring-rings, or wheels, in the shaft, the action on the flax can be so nicely adjusted, as to apply extra work to the fibre requiring such, and to save from useless waste any that is easily cleaned.

The flax scutched in this manner will bring a higher price than that done in the ordinary way, as the fibre is left in a better and sounder state.

The adoption of steam power is not suitable for the ordinary scutch mill, for various reasons. The first outlay is too great, and the expense of working the engine too heavy. The machinery is required for only a portion of the 12 months, generally from August till February, and one-half of the year is thus comparatively lost, unless, indeed, some other kind of useful machinery is on the premises to be worked instead.

In reterries like Watt's, which carry on regular operations during the whole year, steam power is desirable and proper, but for ordinary country flax mills I cannot believe it to be remunerative, and strongly recommend the simple application of water power, which during the winter months can be procured in almost any district.

To economise cost of production is the great point in all manufactures, and as the expense of scutching comes very high in comparison with the relative value of the material produced, any plan that enhances this cost ought to be avoided. The scutching of the flax, including attendance of girls or boys, and carriage to and from the mill, costs about 1d. per lb.; now the fibre is afterwards often sold for 6d. per lb., so that the cleaning amounts to one-sixth, or 16½ per cent. of the marketable value! Of course some flax will sell at much higher rates than that I quote, but taking even the extra price of 8d. per lb., the cost of scutching will be 12½ per cent. This is, I think, more than the farmer can afford to pay, and it is to be hoped that ere long the charge will admit of reduction to ¾d. per lb., or at most ¾d. So long as the scutchers expect to earn, during the six months they are employed, sufficient wages to keep them the whole year round, no reduction can be expected, but by judicious arrangement, and giving these people regular employment at some other useful and remunerative occupation during the spring and summer, the cost in wages might, I think, be reduced, and the millowner ought, from patriotic motives, to be satisfied with a very moderate profit for his machinery.

I do not wish to appear severe on the "scutching interest," but it is an undoubted fact, that the process is too expensive, especially for coarse flax, and that the sooner a reduction of cost can be effected, the better for the flax growing community and the public at large.

The total number of flax-scutching mills in Ireland in 1852, was 956, and of stocks* therein, 5,053. Of these, 926 mills and 4,722 stocks were in the province of Ulster, showing that this province still retains the lion's share of flax cultivation and manufacture.

The proportion of mills in all Ireland to the number of acres of flax grown, was, therefore, one mill to every 133 acres, while the proportion of stocks was one to every 272 acres.

The motive-power employed in the Irish scutch mills, in 1853, was—

Water only	865
Steam only	47
Water and steam.....	5
Horses	14
Wind.....	25

Total..... 956

The great objection to the ordinary mill is, I think, the expensive charges made for scutching, for with a little care in handling, the flax, if previously well watered and grassed, can easily be cleaned to the satisfaction of the most particular buyer. Some very ingenious inventions have however been patented to facilitate and improve the cleaning operation. Among them may be mentioned that of Robert Plummer, Esq., of Newcastle-on-Tyne, who thus describes his new rotary disc scutching mill:—

"The novelties in this machine are, the application of whalebone, wire, bristle, or other brushes, instead of the ordinary wood blades, and of discs instead of the radial arms, also an improved form and position of the scutching board. The superiority of execution lies in the fibre being much better and more quickly cleaned, and in its being made much finer (nearly heckled in fact), the tow or offal being also much cleaner, and of more value. Increased efficiency and economy are obtained by the disc enabling more brushes (or blades) to be put on the machine than can be put on the radial arms; by the discs being able to be set with brushes (or blades) on both sides, (so as to get both a right-hand and left-hand stand,) double work is done in small space and very nearly for the same power; by the discs keeping the fibre steadily on the scutching-board, and not lapping it round, and cutting and tearing it away at the ends as is done by the strong and rapid blows of the radial arms; by the superior manner in which the brush penetrates the straw, and splits and cleans the fibres from gum, as compared with blades, and by the form and position of the scutching board making the stroke fall on the fibre more perpendicularly, so as to produce a longer stroke. A machine of two discs will scutch *five hundred weight* of straw per day with *four hands*."

The rotary disc appears to be a good idea, and I hope it will have a fair and proper trial, and that the result may prove beneficial to the flax manufacture. I am not so sanguine about the system of brushes instead of blades, but it is an ingenious invention, worthy of being fully tested. The brushes would, I fear, soon wear out, and be a source of expense to have renewed; however, this defect may perhaps be remedied.

Mc Bride's patent machine is in high favour with some parties; it also shows considerable talent in the various details of construction. It is manufactured to order by the respectable firm of McAdam and Co., Soho Foundry, Belfast, and stated by them "to be perfectly self-acting, and to require no more attention after the flax is once put into the machine, no skilled workmen needed, and warranted to do a ton per day with the attendance of only four ordinary labourers or women. This machine, with the driving arrangements, costs £200, and requires four-horse power."

Wilson's machine is a medium between the hand-scutching and the ordinary flax mill; the price is about £20. C. Merten's patent (of Ghent, Belgium,) appears to resemble Mc Bride's in some respects, but "all clasps or holders for fastening the flax, or breaking machines, are dispensed with, so that the work is of the simplest possible kind, the attendants being all of the class of ordinary labourers, and the cost of scutching is thus largely diminished. The double machine will do, in the day of twelve hours, from 45 stone to 55 stone (of 16 lbs. each), according to the quality of the flax. The single machine does the half of that quantity. They are adapted for all kinds of straw flax, whether hard or soft, and can be altered in a moment to suit different qualities. The flax is scutched with perfect safety to the fibre, leaving the reed whole from end to end. It is evident that the yield of fibre from a given quantity of flax straw must be greater than in any of the ordinary modes of scutching. Hardly any tow, and no dust, is produced by the machine. The power required for driving the double machine is four-horse, and half the power for the single machine." One of these machines is at the Industrial Exhibition in Paris. If it performs all that the inventor proposes, this machine may also prove beneficial.

No doubt there may be many more new machines in existence than the few I have just named, but these are the best known and most spoken of. If any remarkable ones are omitted, I shall be very happy to receive a description of such from the inventor.

Well informed and practical men generally recommend the frequent use of a series of rollers, to bruise and break the woody part of the plant before submitting it to the

* The stock is one scutching board, with its four or five blades round the shaft opposite.

action of the scutching-blades. The refuse taken off by these blades, technically known as "scutching tow," is of little value, and, consequently, the less time spent under this severe operation, the more likely is the result to be satisfactory. The flax is very little if at all injured by the pressure between the rollers; when this process is successfully applied much less scutching is required; thus, an important economy of waste matter is obtained, and at the same time the fibre is preserved in a more healthy and natural condition.

The system of rollers in operation at Watt's patent rettery, near Lisburn, appears very perfect, and I am told the action on the flax is very satisfactory.

In erecting a new mill for cleaning flax, the owner should certainly avail himself of this information, and introduce the plan of rollers here recommended as a preparatory step to the other scutching process. I believe Watt's system of rollers is patented, but no doubt an arrangement could be made with him, or some other effective and useful plan adopted. I cannot conclude this letter better than by inserting in full the well-experienced views of a gentleman who has been good enough to give me the benefit of his experience, and who, from his intimate acquaintance with the scutching process, as well as all the other details of flax management, is enabled to give on these subjects as sound an opinion as any man in Ireland.

This paper was kindly written for me a few months ago, by Mr. John Macarten, of Waringstown, County Down, and will speak for itself, without doubt, better than any synopsis I could prepare:—

"I can add very little *new* to what is already known concerning the operation of scutching flax. One thing, however, I am convinced of, that the less scutching it undergoes the better. We all know that flax is the proper product of the plant, and that *tow* is produced by the injury the fibre receives in the process of separation from the woody matter of the stem.

"Having long thought that much improvement might be made in the preparation of the straw before scutching I last year (as land agent) got new rollers, of an improved construction, for Major Waring's flax mills, which have produced *more flax* than usual from the straw, with *less labour*. This effect is produced by the application of increased power to the rolling or breaking of the straw before scutching, which power is in part obtained by the peculiar construction of the rollers themselves; and the more completely the straw is broken without injuring the fibre, before being submitted to the operation of scutching, the yield is the greater, and of superior quality.

"Flax should not be scutched *immediately* after grassing, for the straw is 'husky' and *fresh*; and much of the fibre being carried away by the handles the yield is much deteriorated both in quantity and quality. By keeping the straw in stack at least a month before scutching, the fibre is much improved both in strength and silkiness, or as some term it, in "spinning quality." It is also improved by merely buffing it at the first operation, and holding it over 10 or 12 days before *finishing* it off.

"And now, permit me to add a word or two with reference to the growing and steeping of the plant.

"I have been in both France and Belgium, and paid great attention to the various preliminary operations as there conducted, and this is the result of my observations. They work the ground for flax as carefully as we prepare it here for onions, and use every means to have the soil as nearly as possible of uniform texture, both as to tilth and the chemical compounds of the land, using such manures as science points out to neutralise the excess of one ingredient and to supply the deficiency of another, so as to have all the soil of *equal quality*. Here, on the contrary, in some of our fields we find four or five *different kinds of soil*, and consequently four or five *different qualities of fibre* are produced from the same seed sown on even our best cultivated farms. Unless we improve our land by a better and more scientific system of cultivation, we can never successfully compete with them in the production of FINE FIBRE for the cambric manufacture. Again, many farmers attempt to grow too much flax in one year, and are, therefore, obliged to sow too often in the *same ground*. As the result of my observations abroad, as well as of my own experience at home, I would say that flax should come in the course of a *long rotation*, and only be sown in the same field at an interval of *eight or nine years*. My own farm, indeed, from my previous ignorance of this most important point, is almost *sick* of producing it. In this respect

I am of opinion that the exertions of the Royal Flax Improvement Society and the Chémico-Agricultural Society are calculated to be of immense service, by spreading among flax-growers a knowledge of the most improved systems of cultivation, as well as explaining the various organic matters which enter into the composition of the plant.

"The steeping is another operation the proper performance of which is of vital importance. Were I in the position of a landed proprietor, I would construct at my own expense a proper steeping tank or pool on each farm, *with a blue clay bottom* if possible, and provide for it a proper covering of stones, so that the farmer should have nothing to do but sow the flax, and would be sure, after a little experience, of having it properly watered. I have myself known flax to produce 5s. 6d. per stone *additional* from this operation having been carefully performed!

"In conclusion I would say, let due attention be paid to the proper growth and steeping of the flax, and then the farmer will have no cause to complain of the scutching, or to grumble at the price the produce of the crop will bring in the market. Science informs us that the object of steeping flax, is to dissolve the gummy or resinous matter which holds the woody part and the fibrous portion of the stem together, and as soon as that purpose is effected it should be immediately removed from the pond, for every hour after that, tends, in the continued process of fermentation, to weaken and rot the fibre, and in the process of time would render it utterly worthless. If, then, the steeping has been properly attended to, very little scutching will be required. I have often thought, indeed, that if any other means could be devised for the separation of the woody from the fibrous portion of the plant, we might dispense with the operation of scutching altogether."

APPENDIX TO LETTER X.

When writing last year (1854) on the subject of profits realised by the cultivation of flax, (see Letters IX. and X.,) I gave a statement of several crops grown by different individuals, who had kept regular accounts of the expenses incurred. I endeavoured to prove that an *ordinary* crop would leave a *fair* profit, whilst there was a probability of obtaining a *very high* remuneration from an *extra* crop.

Now, on examining the different statements I collected at that time, I was somewhat chagrined to find that my own profits appeared to be at rather a low average; however, as my farm books are kept more correctly than the majority of such accounts generally are, and as I knew the statements furnished by my land-steward contained "the truth, the whole truth, and nothing but the truth," I was impressed with the idea that some items might have been omitted by accident in the other calculations; but on looking over them carefully I could not detect any serious errors. My highest rate of profit from 1844 to 1854, was £5 to £6 per statute acre, while, in several of those years, it ranged as low as £2 to £3. When I found that some other parties were surpassing me in the pecuniary results of the flax crop, I naturally became anxious to emulate so laudable an example. I stated in Letter X., that "I looked forward with hope to some favourable year to obtain an extraordinary crop;" so this season, acting on this resolve, I selected a nice well-drained field, that appeared exactly suitable for my purpose, both in soil and situation. An acre was measured off, but on re-measuring the ground after removal of the flax, it was discovered we had sown a little in excess, and had one acre and two perches. The seed was selected of choice quality, and every attention was given to the growing crop.

The fibre was carefully prepared for market, sold at a good price, and the result has proved so satisfactory that I am amply rewarded for my pains by the best crop of flax I have ever grown; and am not a little proud of having now reached almost the highest point of profit that I ventured to publish in my previous papers.

The following statement has been submitted to me by my land-steward, who kept an accurate account of the various items.

He states that the manual labour was rather higher this season than for some years past, owing to the great demand for labourers at harvest time; and that in ordinary

years a saving might certainly be effected on this item of expenditure as now charged.

FLAX GROWN IN 1855, ON MR. CHARLEY'S FARM,
1A. OR. 2P. STATUTE MEASURE.

EXPENSES.

One ploughing, heavy furrow	£0 12 0
Seed, 2½ bushels	1 16 0
Harrowing, picking off stones, sowing seed, and rolling	0 10 0
Weeding	0 6 3
Cutting rushes, and making ropes of same	0 7 0
Pulling and binding	0 16 5
Carting to yard, and ripling under cover... ..	0 18 4
Carting to water, and fixing in same	0 7 6
Lifting out of water, and drawing to grass	0 5 6
Spreading on grass	0 11 8
Lifting off grass and stooking	0 5 10
Carting to stack-yard, stacking, and thatching	0 8 1
Loading and drawing to scutch mill	0 4 6
Carting from mill and marketing expenses	0 6 3
Drying flax bolls at corn mill	0 3 3
Cartage, &c., of bolls	0 3 8
Rent and taxes, 1A. Or. 2p.	2 5 0
Scutching and striking 53 stones flax, at 1s. 2d.	3 1 10

Total expenses £13 9 1

RECEIPTS.

For flax fibre, 4 stone, at 10s. 3d. £2 1 0
For ditto 49 ditto, at 10s... 24 10 0
For scutching tow, 84lbs. 0 4 10
For 60 bushels bolls for feeding, at 6d. 1 10 0=28 5 10

Profit £14 16 9

Or £14 13s. 0d. per acre!

As the average produce in Ulster is 30 to 35 stones per acre, and the average profit £4 to £5, it will appear very evident that the result I now have the pleasure of reporting is an extraordinary success.

My land-steward says, that from the time of sowing the seed till the final sale of the fibre, every part of the management was fortunate and well-timed; even the weather, so fickle in our Irish climate, smiled on the arrangements, and graciously forbore to harass or retard the out-door manual operations.

For fear of any misapprehension, it may be well to explain why the sum of expenses on this acre, as now furnished, appears greater than the average cost of £9 to £10 previously quoted in Letter X.

The reader must bear in mind that this crop is fully *one-half greater* than the average, consequently, the cost of pulling, carting, scutching, &c., is increased in the same ratio of one-half, though rent and taxes, sowing and weeding, remain the same. This simple explanation will account for the apparent anomaly between the stated average cost of production and the present instance. It may also be interesting to state that the land was ploughed about the middle of November, out of *oat* stubble, the previous crop being turnips.

The field was thorough drained in the stubble after lea, in the very best style, and a portion of the success is no doubt to be attributed to this fact. The quality of the soil is a rich loam; the seed was sown on the 23rd of April, and the flax pulled in the last week of July.

It is rather curious that, being short of oats on my farm in 1854, that crop was substituted for wheat, and thus the flax followed an oat crop instead of wheat, as usual, for, I believe, the first time on my land.

One would very probably argue from this fact that the rotation I adopted this year is the most correct of all, and I should certainly be very unwilling, with a result so favourable before me, to question the propriety of such an

argument; but it strikes me the *early ploughing* generally given to oat stubble, and often denied to that of wheat, is the true secret of the distinction. I should, therefore, strongly recommend, in addition to a good loamy soil and careful management of the crop, thorough drainage and early ploughing.

In conclusion, I wish particularly to impress on flax-growers the absolute necessity of becoming fully acquainted with the nature of the soil required for their purpose, and all the particulars of the most perfect management of the crop.

This will be best effected by reading, discussion, and practical experience. The last-named is by the vulgar very often but incorrectly placed first. This experience is frequently bought so dear, especially in agricultural matters, that impending ruin is often the result. Is it not plainly a wiser course to obtain a correct theory derived from the light of science and tested already by substantial practice?

Let this first be possessed, and when the head is clear and decided on the question, the skilful hands will labour with an increased and increasing reward.

BRITISH ASSOCIATION GLASGOW MEETING.

THE PATENT LAWS.

At the meeting of the British Association, held in Glasgow, the following proceedings relating to the Patent Laws, took place in Section G (Mechanical Science), on Friday, 16th September last.

The report of the Inventor's Fund and Patent Law Committee was read as follows:—

"At the meeting of the British Association in Liverpool (Sept. 1854), a committee, consisting of the Earl of Harrowby, the Dean of Ely, Colonel Sabine, Professor Graham, William Fairbairn, and Thomas Webster, was appointed, on the recommendation of the Mechanical Section (G), 'for the purpose of taking such steps as may be necessary to render the patent system of this country and the funds derived from inventors more efficient and available for the reward of meritorious inventors and the advancement of practical science.'

"The circumstances leading to the recommendation of the appointment of this committee were as follows:—

"Under the administration of the New Patent Law, which came into operation on the 1st of October, 1852, a fund amounting to more than £50,000 per annum is raised from the inventors of inventions for which letters patent may be applied for or granted.

"The raising of so large a sum of money, no less than its present appropriation, may be regarded as symptoms of disease in the patent system, and of defect in its administration.

"If the benefits conferred on the public by the well-directed labours of inventors are to be rewarded by recognising exclusive property in inventions for such a limited time as may be supposed to be sufficient for the perfecting the inventions in matters of detail, and ensuring their introduction into the arts and manufactures, and their adoption by the public, the funds levied on inventors in the first instance, and before any time shall have elapsed for obtaining any portion of such remuneration or reward, ought not to be applied to purposes foreign or even adverse to their interests,* and it would appear but reasonable that such funds, if levied, should, so far as possible, be made available for the encouragement of inventors and the advancement of practical science. Of such an appropriation, inventors, as a class, would have no reason to complain.

"It was under these circumstances, and with these objects, that the Inventor's Fund Committee was appointed.

* An analysis of the appropriation of the funds raised from inventors, from October 1, 1852, to December 31, 1854, is appended at the end of this report.

"On considering the steps to be taken by the Committee for attaining the object of their appointment, the administration of the new patent system presented material obstacles to efficient progress.

"That system had been so arranged as to exclude the law officers of Scotland and Ireland from its administration, and to devolve the whole responsibility on the Lord Chancellor, the Master of the Rolls, the Attorney and Solicitor-General of England, whose other official duties are so numerous and engrossing as to prohibit their affording that attention to the development of a system confessedly so difficult as to be incapable of adequate administration without the co-operation of persons practically acquainted with the requirements of the system intended to be established, and for the establishment of which ample provisions and powers are contained in the Act.

"Under these circumstances, the Earl Granville and Lord Brougham, by whose exertions and watchful care, during the session of 1851 and 1852, the passage of the measure was secured, and others interested in the due administration of the New Patent Law, have already had the subject pressed on their attention, and there is reason to believe that the efforts of the British Association, if continued to be directed to this subject, will not be in vain."

ANALYSIS OF THE APPROPRIATION OF INVENTOR'S FUNDS
LEVIED FROM 1ST OCTOBER 1852, TO 31ST DECEMBER 1854.

(Abstracted from the Reports of Commissioners of Patents.)

	1852—1853.			1854.		
	£	s.	d.	£	s.	d.
Fees to Law Officers of England, Scotland, and Ireland	21,716	1	0	8,649	6	0
Compensations	4,663	5	0	4,537	0	0
Salaries—Officers, Clerks Commissioners' Office—expenses	3,757	19	8	3,686	5	4
Stationery	3,987	4	4	3,432	15	11
Rent of Offices	1,288	12	7	14,053	0	2
Printer and Lithographer	355	0	0	490	0	0
Purchase of Indices	10,831	10	2	29,746	9	1
Surplus Income	1,000	0	9			
	26,311	15	0	15,672	5	9
	£72,911	8	6	£53,030	4	2

MR. W. J. M'QUORN RANKINE, read a paper on this subject, in which, while acknowledging the benefits derived from the amended patent law, he pointed out the following defects in its operations as subjects for discussion in the Section:—

1. The granting of patents for useless inventions.
2. The granting of more than one patent for the same invention during the currency of the provisional protection of the first.
3. The granting of patents for foreign inventions to persons other than the inventor or his assignee.

How far these evils were to be removed by improvements in the administration of the law, and how far, by improvements in the law itself, were subjects for further consideration.

MR. FAIRBAIRN said, he had attended the meeting of British jurors at the Paris Exhibition on this subject, and after a long discussion they came to a unanimous decision that something should be done in order to give greater facilities for the encouragement of invention; and, also, that something should be done to reward the cultivators of science, who had spent their whole life in scientific pursuits. With respect to patents, he had the honour to preside as chairman at the meeting at Manchester, when the subject of the alteration of the patent laws was discussed. A great majority of that meeting were of opinion that there should be in patents, as in Manchester manufactures—free trade; and they were unanimously of opinion that £5 was quite a sufficient sum for a patent. Under the same circumstances, they thought, although a

great number of useless patents might come forward, yet, after all, they would give encouragement to every description of inventions; for, although some might not be applicable to the purposes contemplated in those first views, yet they might suggest valuable ideas. And he thought the patent laws might be greatly improved were patents made still cheaper than they are. The price of £5 for the total expense of a patent was considered quite sufficient for office expenses, and the expense of the government officers, and the commission who might have the management of the patent system. And, provided that was done, they did not think it necessary to have any large fund at command for the law officers, or very high fees to carry out the principle.

MR. WEBSTER apprehended there could be no doubt that the new patent law was a great instalment, but still it was not all that was wanted. The question on which the greatest conflict of opinion existed was, that of a uniform low fee for the granting of patents, without any check whatsoever. The objection to this was the inducement so offered to ignorant persons who would be decoyed on, by hopes of fortune, to make fruitless inventions, for which it would be a fraud to give them a patent. He was not aware of any single witness, of practical experience in these matters, examined before the committee in 1851—which was the most elaborate inquiry which had been made in any country, except the bulky reports by the American commissioners—who advocated free trade, that is, the unrestricted grant of letters patent without fees, and without some restriction and control. Invention consists generally in the application of known laws which persons of ordinary experience could pronounce to be possible or impossible, and it would not be expedient to afford, by the unrestricted grant of patents, that encouragement which the hopes of a fortune would hold out to speculative men: no country had done this. The object of such invention as could be the subject of patents had been accurately described by Mr. Rankine in his opening address to the Section, as the filling up the gap between theory and practice. Earl Granville, and some few other persons of eminence, had recently expressed an opinion that the whole patent laws were a delusion on the inventor, and the sooner they were swept away the better. He believed they were perfectly justified in such opinion, on the evidence afforded before the committee of the abuses of the old system. But with these exceptions, he was not aware of any persons who had studied the subject holding that opinion. He asked how they could draw a distinction between patent right and copyright? Both were the labour of mind; and the question was just one of brains against capital, which would go on as long as society existed. The greater portion of the objections pointed out by Mr. Rankine were provided for by the law, if fully carried out. They had all been stated and discussed before the committee of the House of Lords in 1851, and there was the power of dealing with every one of them. There was nothing so unreasonable, as at first sight might appear, in granting patents for foreign inventions—the success of inventions abroad was no guarantee for their immediate or even early introduction here: There was much to be said on this subject, as the history of such inventions would show. It was a notorious fact that the greatest inventions required a vast amount of perseverance and capital to force them before the public. It was not to be expected that a man whose old machinery would be rendered worthless by a new invention would encourage it, and masters were not always ready to encourage inventive talent in their workmen. It did not follow because an invention had secured a foreign reputation, that it would be immediately adopted in Britain, as was witnessed in the case of the galvanised iron, and many other inventions. As the bill originally stood it was compulsory, by the 8th clause, for the law officers to obtain the opinion of competent persons, but a committee of the House of Commons thought fit to make it optional. He believed the committee appointed last year had been

instrumental in effecting important changes, and he thought the committee, recommended by the committee of the Section, with the assistance of the Duke of Argyll and Lord Harrowby, would secure many more.

Mr. ARCHIBALD SMITH was convinced that a majority of scientific men and the public were in favour of a repeal of the patent law, and he believed its days were numbered. He held it was the interest of the public, and not the patentees, that should be consulted in the matter. He formed this opinion on a comparison of the evidence given in 1828 and 1851; in the former committee no person was found to give evidence adverse to the policy of the patent law, while in the latter many were found to express such an opinion. This was a growing opinion amongst lawyers and young men of his acquaintance. He did not mean to argue the question on the present occasion, but merely to record his dissent and prophecy on the subject.

Sir DAVID BREWSTER was of opinion that patents should be given gratis—nay, that a bounty should be given by Government for every patent however frivolous. They wanted a great number of inventions; it was an advantage to the public as well as to the patentee. Patents should be absolutely protected, and he could not see the smallest evil that could arise from frivolous patents. No patent could be said to be strictly frivolous. The fact of a patent being taken out is the indication of a want in a particular direction—it was the result of a person seeing a want and trying to supply it. He might supply it in an imperfect way, but at last others would be attracted to the work, and this frivolous idea would eventually become the germ of some better idea in the future. It was in consequence of want of encouragement to improvements in implements of war that we have been so perplexed of late.

Mr. J. F. BATEMAN was opposed to the indiscriminate granting of patents, which inventors would find an excessive evil. He highly approved of Sir David Brewster's idea of bounties to inventors, but he feared the great multiplication of patents would compel persons who wished to construct a new machine to go round about the work, in order to avoid encroaching on old patents.

Dr. NORMANDY coincided in the views expressed by Sir David Brewster. The attempt to limit the number of patents presented great difficulties. Many inventions, thought to be useless when made, turned out to be extremely useful afterwards. Inventors deserved the protection of Government; many of them died in want, while the country was deriving great benefit from their inventions. He understood that the useless patent need not stand in the way of any inventor, for if useless it can be got rid of by *scire facias*. He approved of the system of annual payments, if any were to be exacted; but the present fees ought to be reduced. The old patent system was, happily, dead and buried, and need not now be adverted to.

Mr. WEBSTER, in reply to a question from Mr. J. Heywood, M.P., said, the practice of this country had been to remunerate the law officers for what they did by fees upon what they did not do; the fees paid by the Treasury for official business was not one-tenth of what would be paid by private individuals. The fees on patents might be regarded as an official salary; they received about £5000 under the old, and £9000 under the new system; but this was a fitting subject for administrative reform; the law officers should be paid liberally by a salary, instead of as at present.

Mr. NEIL ROBSON said, the cheapening of patents was much to be desired, and he hoped good would result from the labours of the Committee of the Association.

The Rev. T. R. ROBINSON, D.D., of Armagh, said he could not go the whole way with Sir D. Brewster. He did not think it necessary to stimulate inventors by a bounty, but he felt certain that it is unjust to make them pay for what ought to be theirs freely. No property can be held by so strong a right as that which man has to the

offspring of his brain, the creation of his intellect; and any interference with it beyond what is absolutely necessary, is a gross injustice—an actual spoliation. Nor can it be justified on the plea of benefiting society at the expense of individuals; it is certain that, in the long-run, society cannot be benefitted by any thing opposed to the eternal and immutable principles of truth and justice,—and such is the levying from an inventor a single shilling that can be spared. The notion that by taxing him in this way you prevent useless inventions or absurd patents is fallacious. First—What are useless? Who, in this age of progress, shall decide on impossibility? Had George Stephenson sought, in 1805, a patent for a locomotive to travel fifty miles an hour, it would have been called absurd, and he insane. Then, as to preventing them by making them expensive, he could tell them this was impossible—he spoke from experience—he was often consulted about projects of perpetual motion, wonderful motors—such as a pendulum to go for ever, &c. In some rare instances, he had been able to show the projector his mistake, but in general he left him, resolved, at any sacrifice, to obtain the realisation of his vision. If his own pecuniary means were insufficient, his enthusiastic conviction deceives his friends, and they supply him to an extent far beyond any sum you can venture to levy. Even were it not so, what is this but penal legislation of the worst kind, penal on the exercise of intellect. If any such check be necessary, he could point out a far better mode of applying it; improve primary education, and give the mass of the people some knowledge of those elementary truths of mechanical and chemical science, the ignorance of which not only retards their industrial progress, but subjects them to the wild and ruinous delusions which we are considering. As to saying that the inventor must pay the officers who administer to him the justice which his nation is bound to give him—what can be more iniquitous! If there be any certainty at all in political science, this is amongst its axioms, that the State is bound to protect the life and property of all its members. Why then should this kind of property be dealt with differently from that in land or merchandise?—why should the judges who decide on it be differently circumstanced from those of the ordinary courts?—why should the system of paying them by fees, the worst that ever was devised, survive here, when the common sense of all is denouncing it everywhere else. It was said this mighty realm cannot afford the expense of half-a-dozen additional judges! The very interest of the money wasted since the beginning of the war, by neglect or ignorance, would far more than command a patent executive of the highest talent in the land, and secure it the independence which is essential to deal with the immense interests which are at stake. He (Dr. R.) dwelt on this, as he had observed it was the prominent grievance in the new law; it was real and definite, and if permitted to offer advice to the members of the section, he would counsel them to attack it exclusively at first, instead of weakening their chance by scattering their forces. If successful, there was little doubt that rapid progress would be made in removing all else that was really unjust to a class of men, who, though amongst the greatest benefactors of the world, were, as a body, the worst rewarded by it.

Mr. WEBSTER would refer to a few subjects which had been mentioned, and on which some misconception might exist. The principle upon which the new system was founded was of taking no more from inventors for new patents than the administration of the system might require; but it had been found necessary to provide a fund for compensation and for the law officers. Had more been attempted in 1851, the whole would have been lost. There were not less than fifty persons interested in the fees of the old system. The periodical payments had been adopted with the view of clearing away patents for inventions not in actual use, which, whatever might be thought, was a great practical impediment to the introduction of new inventions, inasmuch as it compelled the

author of useful improvements to make arrangements with the owners of useless patents; the periodical payment was adopted with the full concurrence of the Manchester committee. The money check was not sufficient for checking patents for the delusions to which Dr. Robinson had referred, and it would be for the committee to consider what could be done. It was clearly unjustifiable to levy a higher tax than necessary on inventors in the first instance, but the periodical payments, as a tax on a remunerative monopoly, were not subject to the same objections. The application of these funds would be the subject of further consideration. Many of the observations that had been made had reference to technical matters, to which he would not refer, but he could not refrain from expressing his regret that a citizen of Glasgow, of such great eminence in mathematical and theoretical science as Mr. Archibald Smith, should have raised his voice against a system designed and calculated to encourage applications of science, from which such national advantages had resulted. The Earl Granville had pursued the true statesmanlike course of reforming a system, believed by the public generally to be beneficial and just.

The Earl of HARROWBY expressed his gratification at the discussion on a subject of such importance. He thought Dr. Robinson had laid down the principles in a more extended form than could be maintained, as it would go to give property in an invention, during the life of the inventor, and even his representatives; in copyright it had been found proper and expedient to limit the term, and the same was politic in patent-right. He thought the inventor ought to be protected, and he could not agree with his noble colleague Earl Granville on this point, but the subject was one of some difficulty, and well deserving the attention of a committee of the British Association.

Subsequently the general meeting of the Association at Glasgow, previous to its separating, appointed the Duke of Argyll, the Earl of Harrowby, Sir David Brewster, Colonel Sabine, Professor Graham, Mr. William Fairbairn, and Mr. Thomas Webster, a Committee for the purpose of taking such steps as may be necessary to render the patent system of this country, and the funds derived from inventors more efficient and available for the reward of meritorious inventors and the advancement of practical science.

Colonial Correspondence.

THE NATURAL RESOURCES OF BRITISH HONDURAS.

Belize, British Honduras, October 16th, 1855.

SIR,—I had the pleasure of forwarding to you a short time ago, a sample of fibre made from a species of the *Broumelia pita*. That was not, however, the real *broumelia pita*, or ixtle of Tehuantepec, but the *agave sisalana*, of Campeachy, called by the Indians *pita*. Of this *pita*, as I before stated, the inhabitants of Yucatan make ropes, hammocks, and a variety of other articles. I sent you by the last packet a hammock made of this fibre, and I now send you another hammock composed of the same material, which has just been brought to me from Campeachy.

Mr. Welsh, who has been for many years an extensive mahogany merchant in Belize, has recently established a manufactory of that wood, at Minatitlan, a small village, situated on the river Coatzacoalcas, in the isthmus of Tehuantepec. He has just returned from Minatitlan, and has brought with him several specimens of the vegetable productions of that portion of Mexico. Amongst these is a very fine sample of the fibre of the *broumelia pita*, or ixtle. It is upwards of six feet in length, very silky, and exceedingly strong. It appears to me to be far superior to the hemp and flax which are usually imported

into England; and I think that a fabric much excelling the cloths which are made from those materials might be manufactured from it. The ixtle is by no means confined to the isthmus of Tehuantepec. It is very plentiful, both in the neighbouring state of Honduras and in the British settlement. The Creoles of this country call it the silk grass. I have sent you two specimens of the fibre from Minatitlan, one bleached, the other unbleached. I have also sent you some which I got from the river Ulad, the mouth of which is a little to the north of Omoa, in the state of Honduras. I have likewise sent you some of the fibre of the silk grass, or ixtle, of this country. I do not think that there is much difference in the quality of any of these fibres; that from Tehuantepec is certainly the most beautiful in appearance. But the Indians of that country having been long accustomed to the use of the ixtle, making of it every kind of fabric of which they stood in need, understand better how to select the plant, and how to prepare it. In the state of Honduras, and in this settlement, it has never been used for any other purpose but cattle whips and fishing lines. Mr. Welsh was kind enough also to bring me the plant itself, but as it appeared to be in a drooping state, I have put it in the ground, hoping that by that means it will revive. If it should recover, it is my intention to send it to Sir William Hooker, along with some of the same plants grown in the British settlement, to procure which I am about to despatch a person to the river Sibun, where they are to be found in great abundance. It is a species of aloe. The leaves are soft, dark green, from five to eight feet long, and an inch and a half or two inches broad. Along the edge of the leaf, at a distance of about six inches from each other, are short, sharp, strong, curved thorns; it is said that when cultivated these thorns gradually disappear. Any quality of the *pita* may be had. When young the fibre is shorter, but very white and soft, but when old the fibre is longer and much coarser. The manner in which the Indians of the isthmus manufacture the fibre is primitive enough. They place a small board upon the ground, and standing on it with one foot at each end they draw up the leaf which is placed underneath it. This is to make it flat and smooth. They next place the leaf upon an inclined plane, and with a rude instrument, made of bone or wood, having a piece of iron inserted at one end, they scrape off the outer green covering, and the fibre is then developed without further trouble. It is afterwards bleached and dried. I have sent you two of the instruments which have been used by the Indians for this simple mode of manufacture. One is made of bone, of what animal I am unable to say; but I strongly suspect it was not a quadruped, (human life is cheap in this part of the world), and the other of mahogany and iron.

There is a tree in this country and in Mexico, called the Mammee; it is a tall, straight tree, spreading at the top, and having long dark green leaves, with down on the outer side. It bears a fruit about the size of a cocoa nut when denuded of the husk. The rind of this fruit is rough, and of a pale brick colour, or perhaps it comes nearer to burnt sienna. The inside is soapy, of a yellowish pink colour, and has somewhat the flavour of molasses, with the addition of a little lime juice and a touch of the tar-brush. You might imagine that it is no delicacy; the natives, however, eat and relish it. But what will they not eat, "bless their stars, and call it luxury?" It contains a large oval seed, of a blackish brown colour, and highly polished, the kernel of which has a strong taste of prussic acid. The Indians cut the kernel in small pieces, roast them and mix them with their chocolate; some take them alone. It is said to be agreeable, nutritious, and sedative. An infusion of the dried leaves is a powerful narcotic. The infusion of the bark is a narcotic and a tonic. The Indians of Tehuantepec extract an oil from the kernel of this nut, which they apply to their hair, and to which they ascribe certain medicinal properties, but what they are I have not heard. I have sent you a small quantity of this oil, which was brought from

Tehuantepec. If some analytical chemist connected with the Society would undertake to analyse it, perhaps it might be found to possess several valuable qualities. It could be made here, as well as procured from Minatitlan, in large quantities. The seed itself could also be sent to England. I have sent you the rinds and seeds of two of the fruits. I have been favoured with the following description of the mammee tree by Dr. Young, a long resident in this country :—

“Mammee apple, or *Mammee Americana*, belongs to the natural family of Guttifera, and forms a fine spreading tree. The fruit is large, with a double rind, the inner one very bitter. The pulp contained within these has an agreeable taste and slightly aromatic smell, and is much esteemed. Each apple contains a single seed, as large as a hen's egg. The flowers are used in flavouring a liqueur made in some parts of the West Indies, called *eau or creme des creoles*. There is no doubt of a fine oil being contained in the seed. I am disposed to think the mammee tree indigenous, as it is to be found in retired parts of the forests, and the fruit from its stone is not likely to have been carried there by birds.”

I sent you by the last packet some of the bark of the Honduras *cinchona*. I now send some grown in Tehuantepec. The sea air, to which it has been exposed, I am afraid has injured it, and considerably diminished its bitter quality. When in good order, it is as bitter as the *quinquina* of Peru. The Mexicans consider it equal, in intermittent fevers, to quinine.

An inspissated juice is procured from the tree in Tehuantepec, which the natives call amber gum. That is all I know about it, but I send you some in a small calabash, in order that it may be examined. I think it might be used as a varnish. I have got a considerable quantity of it, but it is in a vessel which is much too large to send by the packet. I will, however, forward it to you when a cheaper mode of transit presents itself.

Mannatees, or sea calves, are found in certain parts of British Honduras in great numbers. They are frequently caught and brought to the market in Belize, where they are snapped up with the greatest avidity. The flesh is very white and delicate, something between pork and veal. The tail, which is very fat, is most esteemed. This caudal luxury is generally soured, or pickled. I do not myself fancy the flesh of this brute, for it is so inhumanly human—it reminds one so much of a mermaid, or of one of the fifty daughters of Nereus—that to eat it seems to me to be an approximation to cannibalism. It appears horrible to chew and swallow the flesh of an animal which holds its young (it has never more than one at a litter) to its breast—which is formed exactly like that of a woman—with paws resembling human hands. But these notions would be considered highly fantastic by those who masticate a monkey with the greatest relish—partake with *gusto* of rattlesnake soup—and voraciously devour an alligator stew. The manatee is commonly found in shallow water, at the mouths of rivers, where it feeds upon the marine herbage which there grows in great luxuriance. It has no teeth, but two thick, smooth, hard, unserrated bones run from one side of the mouth to the other. I am inclined to think that these bones might be used as a substitute for ivory. I shall endeavour to send you some. I shall likewise send you some alligator's teeth. These are very hard, white, and polished. They might be used for a variety of purposes. In this country they are used by smokers to extinguish the fuse with which they ignite their cigars. The tooth is hollowed, bound and tipped with silver, and fixed to one end of a chain, at the other end of which a steel is attached, for the purpose of striking a light. The fuse consists of the bark of a tree enclosed in a piece of dry cotton.

It is well known that the alligator emits or throws off an odour resembling that of musk; the proximity of the animal is always denoted by that scent. In proceeding along the various rivers of this country, it has often been to me very perceptible. The odoriferous substance is

supposed to reside under the fore fins. It is worth while ascertaining the exact affinity which the substance bears to real musk. I have made arrangements for the capture of an alligator, from which (when caught) I shall extract this substance. Perhaps if I were to bottle up some of his tears, they might be useful to a few modern professors of philanthropy, or sympathisers with poor, distressed, ill-treated Russia. Alligators are much more plentiful than musk deer, and if the odorous material which those amphibious monsters possess could be used as a substitute for the expensive secretion of the deer of Thibet or Siberia, an alligator fishery would be productive of good in more ways than one.

I have the honour to be, sir,
Your very obedient servant,
R. TEMPLE.

Home Correspondence.

CORT'S INVENTIONS.

SIR,—It was to be foreseen, as the inevitable consequence of agitating in your columns the painful question of the treatment of Mr. Henry Cort, that our national honour would suffer throughout the world, wherever your valuable pages circulate. But true honour can never be attained by cloaking a dishonour, which, so far as the public at large is concerned, has been incurred much more by ignorance than intention. The extraordinary patience of Mr. Cort's children under cruel neglect, devoted to an independent life of honest industry, has suffered to rest in silence a matter a thousand-fold more important than a thousand subjects which have in the interval been loudly sounded, and obtained pensions and testimonials. The injuries and misrepresentations inflicted by a few designing men have remained as it were concealed from the public knowledge, and we can hardly blame a nation for being ungrateful when not informed of the debt of gratitude it owes. I have been led to write these remarks by perusing a severe article in the *Scientific American*, of the 15th December, headed “Gratitude to Improvers of the Iron Manufacture.” The article commences :—“Republics have been accused of pre-eminence in ingratitude, but are monarchical governments stainless in this respect? Let us take a case, and try it.” The writer then proceeds with a summary of Cort's inventions, as detailed in your pages, “now used in the manufacture of bar-iron in every civilised country under the sun. All nations are his debtors; the benefits conferred upon them by his inventions are beyond calculation, and have raised Great Britain from being an importer of iron from Russia, America, and other countries, to be the greatest iron manufacturer and exporter in the world.” He then narrates how the inventor was ruined “by a deputy of the Navy, who saw at once the value of the improvements, and privily supplied capital from the funds entrusted to his care,” and after recounting the subsequent flagitious events, and the amount in dollars of the “boundless generosity of the British Government,” concludes thus :—“Oh! what ingratitude! Can any republic be more ungrateful—has any republic ever exhibited so much ingratitude? We think not. Do not let the British public throw the blame of such ingratitude upon their government; they hold the purse-strings, and the blame must rest on them. One of Henry Cort's sons and three daughters, each over 70 years of age, are now living in indigent circumstances in England, while the nation has grown rich on their father's discoveries. If the monarchy desires to show its gratitude, here are worthy objects for its display. May such charges never have to be made against our own country.”

Truly, no step should be omitted that may tend to exonerate us from charges such as these. The Society of Arts has commenced the reparation of these great wrongs.

by instructing the people on their existence. A most important paper is now in progress at your meetings, displaying the results of these great inventions in foreign nations as well as in our own. Can the Society of Arts have a nobler opportunity of doing further justice in the cause they have espoused? May I hope that it will be compatible and consistent with your forms and with your objects, as a means of disclaiming the imputation which has reverberated across the Atlantic, that when the Chairman moves, on the 9th of January, the vote of thanks which Mr. J. K. Blackwell will have so well deserved, there may be coupled with it a vote "of thanks and sympathy to the memory and the merits of Henry Cort, whose inventions, by furnishing the existing means of manufacture, have supplied the materials of this elaborate paper, and afforded the Society the gratification and instruction of listening to its perusal." I cannot doubt that a vote to this effect would be carried by acclamation.

I am, Sir, your obedient servant,

DAVID MUSHET.

December 31st, 1855.

A PLAN TO RENDER POPULAR INSTITUTIONS MORE EFFICIENT.

Sir,—I desire to submit to the Council, and, through the *Journal*, to the Associated Institutions, a plan for supplying a felt and confessed want. This is done with a conviction that definite, systematic, and useful teaching, is the only thing which can raise these Institutions to their true position.

It would be easy to dwell upon the pecuniary, social, and moral advantages certain to accrue to the members of popular Institutions from their advancement in useful knowledge, and from the intellectual culture by which it is always accompanied; to show how improvements in arts and manufactures may result from the better training of those engaged in them, and how the practical and the scientific would thus be more closely associated, to the great advantage of the State. This is unnecessary, save with persons who doubt the usefulness of popular education, whereas the present suggestions are addressed exclusively to those who are convinced of its utility and engaged in its advancement.

The true function of Mechanics' and similar Institutions is, to take up the bulk of the population where the schoolmaster leaves it, and to carry forward its education as far as the daily duties of life will allow. Amusements form a legitimate addition to the severer part of their duties, but unless a considerable educational advance is made by their means, much well-meant zeal and labour are ill bestowed.

The most intelligent managers of these Institutions feel strongly the necessity for some more educative proceedings than they have adopted hitherto, but are at a loss how best to attain this end.

Believing that one course only can raise these Institutions to the highly useful position they are destined to occupy, and that no existing body can do so much to forward this advance as the Society of Arts, I venture to hope that the present, or some similar plan, will meet with the approval of the Council, and will be reduced to practice.

Certain common-sense maxims have been so frequently forgotten in the practical conduct of popular Institutions, that they need to be stated at the outset.

No more should be attempted than can be done well.

Quality and not quantity must be aimed at.

Mental discipline is the true object of education.

I shall assume at once that amateur-teaching is useless for the purpose of real education, and that competent paid teachers must be provided in every case, or the work be left undone.

The few remarks I propose to offer in this preliminary memorandum may be arranged under the heads of

I.—What is to be done.

II.—Means for its accomplishment.

III.—Whence can the funds be derived.

I.—The true work of popular Institutions is the carrying forward education begun at school. They forsake their province when they assume the place of the elementary schoolmaster; and aim at the unattainable when they strive after the grasp of University Professors. They fulfil their mission when they labour to perfect the work begun in the elementary and commercial schools, and stand to the pupils of these in the same relation as Universities stand to those who have passed through our great public schools. Both should give to their members intellectual culture, which may be applied to any technical necessity of their walk in life, but neither can attempt the technical without vacating a higher vocation.

I apprehend the instruction should be divided into two courses, and, if possible, every student should pass through the first before attending the second. Where this cannot be, he should be required to pass an examination in the subjects of Course I., or to have attained such a grade (21 ?) as to leave the responsibility of failure entirely upon himself, if he resolve at once to attend the higher instruction.

The first course would include the *principles* of knowledge, and would rather aim at making the student truly master of the stores he appears to possess than attempt to add much to them; whereas the second course need have no limit but the capacities and opportunities of the teacher and the taught.

Probably the most successful plan of instruction would be found that wherein the pupil procures and endeavours to master an approved text-book, and the instructor vitalises the book, and in a conversational lecture adds such supplemental or illustrative matter as he thinks adapted. No other system seems so likely to secure on the pupil's part that mental effort which is necessary to culture, or on the instructor's that due amount of help which makes effective the labour of the instructed.

The things to be taught form two divisions, each of which would require its proper teacher.

DIVISION I.

Elementary mathematics, including arithmetic, algebra, geometry, mensuration.

English language, from spelling up to the most refined criticism.

History—(query, English only?)—from the usual dry facts taught under this name, to Hallam.

Geography, from maps and names to *Cosmos*.

DIVISION II.

Chemistry, as the basis of common knowledge, and not as a technical science.

Science of common things.

General physics.

It is difficult to convey an accurate idea of what is intended in the scientific portion of the instruction without enlarging to an extent beyond the scope of this paper. The best illustration which occurs to me at the moment is that they shall do for their members (*mutatis mutandis*) what the Royal Institution does for its subscribers. They are not to make analysts or electricians, but to teach as much of science as will improve practice. The scientific teaching would vary with the character of the locality in which it was given; and in the adaptation of it to existing wants would consist a great portion of the teacher's skill.

Towns, with their surrounding districts, are divisible into agricultural, manufacturing, mining, commercial, seaport, and mixed; and it is obvious that what would be invaluable at Lincoln or Exeter might be comparatively worthless at Liverpool; while what Manchester prized would meet with deserved neglect at Portsmouth. The local character of much of this teaching is an indispensable requisite of success.

An interesting and instructive feature of this department would be occasional visits of the teacher and his

class to neighbouring manufactories, &c., to which the managers of the Institution would procure them access. A few preliminary lectures on the principles and details of the processes carried on would excite a laudable curiosity, and add zest to the visit, while a review in some subsequent lectures of what had been seen would fix the whole in the minds of the visitors, and make them appreciate an educational system thus carried out.

From this outline of what is to be done we turn to the means for its accomplishment. These are, a teacher for each division of the instruction, maps and diagrams for Division I., a laboratory and its concomitants for Division II., and a museum, which may be used by both teachers as well as by occasional lecturers who might visit the Institution.

The subjects of Division I. are quite within the grasp of a person of fair education, and may serve to fill up all his time. If he deliver two lectures a week in each subject, and each subject be divided into two courses, his instruction will occupy 16 hours per week.

If the same rule be applied to the scientific division the lectures will amount to 12 per week, and if, to this be added the charge and arrangement of the museum and laboratory, it appears fully as much as most men could do efficiently. Before a person can be fit to discharge the duty of an instructor such as I am supposing, he must combine the possession of knowledge with an aptitude for communicating it, things which do not by any means always accompany each other, but which are indispensable to the avoidance of certain failure. Since it is altogether improbable that the managers of the Institutions themselves would be able to ascertain the qualifications of candidates for teacherships, it is proposed that all agree to appoint no one who has not a certificate of competency under the seal of the Society of Arts, and that the Society charge itself with the examination of any person desirous of the office.

The local managers would, of course, have the entire power in the appointment and removal of the teachers, and they must, therefore, assume the responsibility of inquiries into their moral qualifications, holding the Society of Arts responsible for nothing but what was contained in its certificate.

There is little room for doubt, that demand would soon create supply in this matter, and that a certificate fairly won in an examination beyond suspicion, would be an object of ambition to many persons highly qualified whose merit must now be doubtful owing to the common system of giving testimonials.

It would be essential to success that the Society should annually depute some one to visit the Institutions, examine the pupils, and report generally to the Council; a copy of such report being *at the time* sent to the local managers.

At these examinations, class lists in the order of merit, would be suspended in the rooms of the Institute, and an award made of any prizes for which funds existed.

The expenditure necessary to carry out this plan would be that of the Society of Arts, on account of the examinations and (at first) organisation.

That of the Institutions for salaries and wear and tear, and (at first) the fitting up of suitable lecture rooms, laboratory, and museum.

The Society of Arts would, I think, have no difficulty in raising a special fund for this purpose. Many wealthy and benevolent persons desire the spread of *bona fide* education among the classes for whom these Institutions are designed, and stand aloof because they doubt or deny the educational character of what is done at present. If they were once assured that a reality was to be attempted in an earnest spirit, they would readily assist in its furtherance. But could funds be obtained to meet the local expenditure? I think they could. Donations and subscriptions would certainly be obtained at the outset, and would, probably, last long enough to give the scheme a fair trial. Should

it succeed they would not be likely to fall off, and if it did not there is no reason why they should be continued.

In this, however, as in all other things which are to last, self-reliance is the true ground of trust, and they who are benefited must be prepared to pay for the advantages they receive. The following considerations will show they are able to do this, if, like their incomes, the payments be required weekly.

An Institution in a town of 20,000 inhabitants would, probably, have the following attendance at the rates of payment stated:—

Fee for Course I., 3d. per week.

Fee for Course II., 6d. per week.

Text-books to be found by pupils.

DIVISION I.—COURSE I.

	Pupils	Fees.	d.	s.
Mathematics	40	× 3d.	= 120	= 10 per week.
English Language	40	× 3d.	= 120	= 10 "
Geography	20	× 3d.	= 60	= 5 "
History	20	× 3d.	= 60	= 5 "
			30	

COURSE II.—Half the pupils at double fee = 30s. per week.

Total fees, Division I., £3 per week.

Vacation, 10 weeks in summer.

2 weeks at Christmas.

Total ... 12

Fees, 40 weeks × £3 = £120 per year.

Lectures on each subject per week ... 2

No. of subjects 4

8

No. of courses..... 2

16 lectures.

Weekly total 16 lectures.

DIVISION II.—COURSE I.

	Pupils	Fees.	d.	s.
Chemistry	40	× 3d.	= 120	= 10 per week.
Science of Common Things.....	60	× 3d.	= 180	= 15 "
Physics	60	× 3d.	= 180	= 15 "
			40s.	

I do not apprehend any falling off of numbers in the higher course of this division, and, therefore, the fees would be

40s. × 2 = 80s. = £4 per week.

Total fees, Division II.—40s. + 80s. = 120s. = £6 per week.

Fees, 40 weeks × £6 = £240 per annum.

Lectures on each subject per week 2

No. of subjects 3

6

No. of courses 2

12 lectures.

Weekly total..... 12 lectures.

I believe these sums would secure the services of competent instructors; and though it would be desirable to augment them ultimately, yet they would suffice to test the plan long enough to remove it from the region of speculation to that of knowledge.

Local subscriptions and donations would assuredly suffice to meet the wear and tear, and the only subject of difficulty would be the fitting up of an adequate laboratory and museum.

If my notion of the latter be a correct one, its cost would be small.

Each museum ought to differ from every other, and to bear written upon it "LOCAL," in unmistakable characters.

The industry, geology, mineralogy, &c., of the immediate locality should be so represented that members could study them fully and accurately, and no attempt should be made to collect specimens with any other view. All things foreign to the locality should be strictly illustrative of local ones, and if not, should be excluded by the rules. This would give a maximum of utility with a minimum of cost, as nearly the whole of the objects would be presented by friends, or obtained by a little labour of members of the Institute.

It is obvious to remark that Mr. Twining's museums would find congenial homes and furnish topics for valuable lectures under the second head of Division II.

The laboratory (including maps and diagrams) would be the most costly thing, and, in the majority of cases, some extraneous help towards the expense of this would be indispensable. Should the Society's special fund be adequate, it might render assistance to the extent of say a third of the cost. It might also reduce the expenditure nearly another third by suggesting instruments less costly than, but equally efficient with, those in the catalogues of philosophical instrument makers. Institutions of this practical character should pay nothing for appearance but all for use. The Society would also obtain a trade reduction on this portion of the Institutions' purchases as it does on books. With such an amount of help, I believe, the obtaining of what is required would be generally practicable.

I am, Sir, your faithful servant,
W. R. BOWDITCH.

St. Andrew's, Wakefield,
December 1st, 1855.

[*.* The Council call attention to the foregoing letter, and invite discussion on its contents, and at the same time would refer members and Institutions to the correspondence received by the Industrial Instruction Committee of this Society, and printed as an Appendix to the Report of that Committee.*]

DECIMAL COINAGE.

SIR,—I have read with much interest the letter of Mr. Franklin, in your *Journal* of the 21st December; an interest increased by a rumour that has for some time prevailed, that several of the more active leaders of the "Decimal Association" have been using their influence to obtain that gentleman's appointment as Secretary to the Coinage Commission. This circumstance would afford a sufficient explanation, why, "since the appointment of the Royal Commission, he has abstained from public controversy," on the important question to be determined, he having been previously, in common with the rest of his party, very far indeed from "content that the whole inquiry should be re-opened." The Commission, however, owe it to their own character for impartiality to appoint as secretary one whose mind is capable of an unprejudiced examination of the evidence, for with two out of three members subscribing approvers of the pound-and-mil plan of the association, they would render all their proceedings justly suspected in the eyes of the world, where they to appoint as secretary one who is an out-and-out supporter of that delusive scheme.

I cannot allow some passages of Mr. Franklin's letter to pass without remark. He appears to think that the commission "will virtually have little to do beyond making a selection between the penny and the pound as the norm of decimalised reckoning." But surely, (to say nothing of several other decimal systems proposed, all having certain advantages and disadvantages of their own), by far the most important business of the Commission will be to determine whether the theoretical benefits to

be derived from any change will counter-balance the practical advantages of the existing system to such an extent as greatly to outweigh the certain mischief resulting from the change itself. This branch of the subject, which ought to have been the preliminary inquiry, was strangely ignored by the one-sided Committee of the House of Commons, and has still to be entered upon in serious earnest if any practical result is to be obtained. The first question for the Commission will undoubtedly be whether this country, which has long possessed the most complete and satisfactory currency of European states,—a coinage of world-wide fame,—is to sacrifice the great advantages which it possesses, and undergo all the disturbances inherent in a social change of such a magnitude as that proposed, in order that accounts may hereafter be kept on an entirely new system, which everyone who chooses is even now at perfect liberty to adopt, but which it is sought by means of compulsory legislation to enforce upon all.

My chief object, however, in addressing you is to point out some errors in Mr. Franklin's letter, which materially diminish the weight of his argument.

1. I should much like to know when it was that France adopted a "double standard." I have seen letters from the chief of the Bank of France, written within the last few weeks, affirming most decidedly that silver is the *only legal* standard in France. The *circulation* of gold has, undoubtedly, greatly increased in France and America, and also (but in a much smaller degree) in Germany, and it is possible that at some future period France may adopt a double standard as a measure of transition to a gold standard, but at the present time no such double standard exists, and, consequently, it can have no influence on the fluctuations in the price of silver. I may add, that the probability of the future adoption of gold, as either a partial or the sole standard of value in those countries in which a *low unit* of accounts is prevalent, is in itself a sufficient refutation of the charge advanced by Mr. Franklin, and others of his party, against the advocates of a low unit here, that they have a "covert design" thereby to alter the present English standard of value.

2. I suppose it is an inherent defect in the minds of some advocates,—but it certainly is a great misfortune,—that they can never state the case of their opponents or even their own fairly, and without perversion of the facts; at all events, the mode in which Mr. Franklin states the controversy between the advocates of the pound and mil, and of the penny system, proves clearly enough how ill-adapted he would have been for the office which his friends are stated to have been so anxiously seeking in his behalf. He calls it "the penny *versus* the pound and shilling;" further, that the advocates of the latter say, "Proclaim that the twentieth of the £1, or shilling, shall, after a certain date, be equivalent to 12½ pence, instead of 12," while those of the former "plead for the building up of a new decimal coinage upon the basis of the intact penny, discarding both pound and shilling in the process;" a greater inaccuracy in representing the real facts of the case it is scarcely possible to conceive. It is, as Mr. Franklin very well knows, the great merit of the penny system, that instead of "building up a new decimal coinage," and "discarding both pound and shilling in the process," it *preserves every existing coin unchanged, either in name or value*, while the pound-and-mil plan "discards" a large proportion of the existing silver coinage, gives to all the rest, except the new hybrid and un-English florin, and including the "shilling," new denominations, and alters the entire copper currency both in value and in name. Both systems, and both equally, relinquish the shilling as a term of account. What, too, does Mr. Franklin mean, except to mystify the subject, by stating it as the distinguishing feature of the pound-and-mil system, the one thing which its advocates "proclaim, that the twentieth part of £1, or shilling, shall, after a certain date, be equivalent to 12½ pence instead of 12?" In what part of that system does the word penny occur? and where could *such* a penny be found in

* Report of the Committee appointed by the Council of the Society of Arts to inquire into the subject of Industrial Instruction, with the Evidence on which that Report is founded. Longman and Co. 1855.

it, except by the depreciation of the existing coin, or the substitution of some other in its place? But the advocates of the system have over and over again proclaimed that it cannot be carried out, except by the abolition of the penny both in value and in name, and the great question among them has recently been, whether this could most effectually be done by coining two-mil pieces alone, or five-mil pieces in addition to the two.

3. It is hardly necessary to notice that part of Mr. Franklin's letter which relates to the future coinage of Germany. We have quite enough to do with our own affairs, without *dictating* to other nations; I only refer to it for the sake of noticing that after a tissue of the most curious assumptions, such as that Germany will adopt the very singular standard of 93 $\frac{1}{4}$ per cent. fine gold, on the strength of his recommendation, of that peculiar per centage, and that the ratio of the value of gold to silver hereafter to be fixed at 15 $\frac{3}{4}$, he arrives at the conclusion that 200 thalers = 300 florins (English, I presume) = £30 sterling, to which, let me add = 720 pence = 7,200 pence, showing that all these assumptions, absurd and improbable as they are, gives him no advantage in the present controversy. But, in truth, it requires very little knowledge of commercial affairs to be aware that if this or any other ratio between the coins of two countries were to be established to-morrow, the difference in the rate of exchange would very speedily render all such pre-determined relation useless and of no effect. They are, therefore, nothing better than idle speculations.

I am, Sir, yours, &c.,
J. E. GRAY.

December 29th, 1855.

DRAINAGE OF LAND.

Sir,—During the discussion on this subject on the evening of the 21st, allusion was made to a very important matter, namely, the means by which the outfalls should be enabled to empty themselves at a proper level. The question of drainage itself is exhausted, and requires no comment. In order to obtain the richest crops, drain as deep as you can get the water to run off, and irrigate where necessary and possible.

The main impediment to an effectual and permanent system of drainage being fully carried out, is the fact that every river and stream in this country is obstructed throughout its whole length from the source to the mouth, wherever a foot or two of fall for water-power can be gained. Were this impediment removed, as it must be before anything like a general system can be shaped out, drainage would become a very simple operation, requiring no very great engineering abilities to carry out. Every hedger and ditcher knows how to cut off the springs from higher grounds, and is also well aware that the best drainage is that which has the lowest outfall.

Rivers and streams form the arterial drainage of a country, and when they are obstructed by dams and weirs, nature is outraged, and vast injury must necessarily ensue. These obstructions, which have existed, for some purposes from time immemorial, but for mill-power only since the time of the Crusades, were but of little consequence with a scanty, ignorant population, who scarcely cared whether they trod in knee-deep mire or not. Now, every inch of land is required to produce its utmost, and the time is fast approaching when these obstructions will be swept from the face of the earth by their substitute, steam-power, or the inevitable result will be, that we shall be compelled to make use of that same power in order to pump out our waste-water and drainage into the ocean.

The improved productiveness of well-drained land will ultimately be able to buy up and destroy every water-privilege in the kingdom,—in addition to which there is this consideration, that the enormous loss of property and even life from periodical inundations, is mainly caused by weirs and dams placed across the rivers, as well as by their general mismanagement in this and every other country.

All obstructions have the virtual effect of greatly diminishing the total fall to the level of the sea, and prevent the freshes from scouring out the bed. A river allowed to meander in a variety of eccentric curves and windings over an almost level plain, increases its actual length, say, five or six times what it would be if it pursued a tolerably direct course, and therefore diminishes its total fall to the sea to the same proportional extent. The same effect also most surely follows when a river in flood is allowed to overflow and devastate hundreds of square miles of territory, more or less, when that same flood, confined within its banks, would be a most effective and economical agent for scouring out and deepening the bed of the river. Where water may be required for irrigation, or for the uses of man, pump it out of the river by means of steam-power, but put no dams across.

There is another argument, the principal object of this letter, of an equal, if not greater weight, against such obstructions. A great number of our harbours are situated at the mouths of rivers, and the complaint of impediments to navigation from shoals and intricate channels is universal. Many harbours so situated have been long since abandoned, and to preserve others in a state at all fit for navigation, millions are annually expended, which must be set against the water privileges and neglect, as the main instruments of their destruction.

The deltas and shoals of the mouths of the Nile have been produced by the periodical and well-known overflows of that great river, which, in bygone times, rendered Egypt almost the granary of the world; but she has lost her harbour, and what would she be now without the aid of foreign intellect and foreign capital. No need now for that wonderful Pharos, the light of all nations, to guide the vessels of the world into that noble river.

The mouths of the Danube and the Ganges are in a similar state of disorder, and should the canalization of India ever be practically carried out, an operation which will of course require numerous weirs and dams across the latter river and all its tributaries, the Hoogly, in the lapse of time, will become unnavigable except for small craft.

In the New World the tortuous and overflowing Mississippi is in a wretched state at the mouth, while the comparatively straight rivers of South America, the Amazon and La Plata, have noble entrances, unencumbered with shoals or deltas.

To come nearer home, take our own river Thames, the nation's highway, upon which millions have been, and millions more would be, freely expended, in order to improve the navigation, but to what end while the sources of evil remain undisturbed?

From Teddington lock and weir, up to the spring-head in Gloucestershire, and upon all its innumerable tributaries, there are artificial obstructions wherever available fall can be obtained. Very little has been done to confine the freshes within the respective banks, and nothing whatever has been done towards rectifying its course.

If the so-called conservators of the Thames, whoever they may be, had done their duty, the neck of the Isle of Dogs—a large portion of which is seven feet below Trinity high-water mark, would have been cut through, as publicly recommended, towards the close of the last century, and Limehouse, Greenwich, and Blackwall reaches would have been converted, at a trifling expense, into a spacious dock, of enormous area. Neither have the conservators made any attempt to lessen the obstruction of the shipping, boats, and lighters, which latter swarm both in the pool and above Bridge, by imposing a heavy tonnage duty on all cargo shipped or discharged between the banks.

The thousands of lighters obstruct the tideway at high-water, and laying with their flat bottoms on the mud during the ebb, entirely prevent the scouring action of the tidal current. Above all, they have taken no care to see that all obstructions to the free course of the river and its tributaries were gradually cleared away and abolished for ever.

Had these points received due attention, the inhabitants of the metropolis would not now be supplied with putrid water, and we should have heard little of the difficulty of getting rid of the London sewage. The ballast-heaver's trade would only have been needed for the supply of shipping, which, in point of fact, is the case at present, for the conservators will not pay for a ton of ballast got up, unless required for ballasting, while it is the boast of the ballast-heavers that, if they were paid for the work, they would very soon clear away every shoal in the river.

The cost of such an enterprise as the clearing out all obstructions to the natural flow of the Thames, involving the abolition of all water privileges, will appear rather formidable, but at least as large an amount has been expended in the various fruitless attempts to cure an incurable evil, and lost by devastating annual inundations. Be it observed also, that much larger sums have still to be expended in the vain attempt to get rid of the waste water and sewage of London, with the main arterial outfall nearly choked up and all but destroyed.

I am, &c.,

HENRY W. REVELEY, C.E.

Parkstone, Poole, Dorset, Dec. 31, 1855.

Proceedings of Institutions.

CARLISLE.—The members of the Mechanics' Institute held a *soirée* in their lecture-hall on Wednesday evening, the 19th ult. The attendance was numerous, and the whole of the proceedings passed off with great spirit and *éclat*. After tea the chair was taken by the Mayor of Carlisle (Dr. Elliot), who was accompanied by P. H. Howard, Esq., R. Ferguson, Esq., W. Browne, Esq., Alex. Davidson, Esq., the Rev. J. F. Simpson, and Mr. J. A. Cockburn, &c. The Mayor said, they had met to-night at the *soirée* of the Mechanics' Institute—an Institution which deservedly stood at the head of all the Literary Institutions in the town, and that was saying a good deal when they remembered that Carlisle boasted of about 15 or 16 in all. After speaking of the origin and progress of Mechanics' Institutions, he went on to observe that it was, perhaps, not out of place here to call attention to a proposal lately made by Government to Carlisle, inviting its municipal representatives to report as to the practicability and feasibility of establishing a Free Library. The idea of a Free Library originated, he believed, at Manchester, and there the experiment appeared to have worked remarkably well. But there was a difference between Manchester and Carlisle, which would attract attention when they came to reflect. In Manchester the number of professedly literary men was obviously much greater. The Free Library of Manchester, although the number of its volumes was very great, was not so rich in quantity as quality; and there the accomplished scholar or hard student might go with confidence to obtain books which were too expensive for him to purchase. In Carlisle probably the number of such students would not be so great as to warrant the imposition of a tax on the general community, for that was the way in which Free Libraries would have to be supported. The Mechanics' Institution was supported on the voluntary principle, and not by a tax. The Mayor then referred to the correspondence which had recently been carried on in the *Times*, between Lord Stanley and a clergyman, as to the principles on which these Free Libraries were established. The clergyman, oddly enough, maintained the greater promise of Institutions, such as we have in Carlisle, although he (the Mayor) was not aware that he was informed of our proceedings here. He believed that a greater number of small Institutions would much better answer the purposes of the general community than one large central library, however good. He (the Mayor) inclined to the same opinion, because in Carlisle the ex-

periment had been reduced to practice, and found to work extremely well. Mr. A. Davidson, in reply to the Chairman, said, that the Institution was now in as prosperous a state as ever it was. By the last report it appeared that the number of full members was 365; and of reading members (under 21 years of age) 216; making a total of 581. The library contained 3,289 volumes, and he was glad to find that the members had availed themselves of them to a very great extent indeed. The number of volumes taken out last year was 12,558. A few years ago a much greater proportion of light reading was taken out. The number of volumes on history, biography, and science, taken out during the year was 5,767; novels, poems, and lighter literature, 5,543, and periodicals, 1,248. As to the newspaper department, it was as complete as the funds would permit. The committee had been blamed for cultivating that branch, but it had been found that every Institution in the country fell away if it did not attend to it, and the smallest Institutions now possessed their newspapers and periodicals. There was still a debt of £300 on the lecture-hall, but a certain portion of the funds were set apart yearly to liquidate it, and the receipts for letting the room were considerable. Mr. P. H. Howard was the next speaker. After congratulating the Institution upon at last possessing a room of its own, and alluding to the death of Mr. Rogers, offered some remarks on the present aspect of public affairs. Mr. R. Ferguson, with reference to what had been said as to the character of the reading in such Institutions, thought that with proper regulation and judicious selection, works of imagination were a useful and necessary part in the cultivation of the mind. The objection had arisen chiefly in the minds of those who had been familiar with the class of fictions known by the name of the Minerva Press School. This class of literature had, however, been quickly crushed. Mr. W. Browne and the Rev. J. F. Simpson followed, and Mr. Cockburn next addressed the meeting, and said, that with regard to the proposition for a Free Library, he thought that no such Institution ought to be established unless there was a manifest disposition on the part of the public not to support those already in existence. The usual votes of thanks were then passed unanimously.

LONDON.—The Committee broke up the evening school of the London and South-Western Railway Literary and Scientific Institution, for the usual Christmas vacation, on Wednesday evening, the 19th ult., when an entertainment of tea and coffee was given to the boys. On the same evening, Mr. J. C. Brough, a member of the committee, gave a short lecture on "Combustion;" after which, the prizes awarded to the most proficient pupils were distributed. The committee invited the attendance of the parents of the boys, at the lecture and the distribution of prizes, and several were present.—A musical entertainment was given at this Institution, by Mr. Wilson, teacher of the Vocal Music Class, on Friday, December 21st, 1855. The chair was taken at eight o'clock, by Mr. F. I. Macaulay, who, in opening the proceedings of the evening, stated the concert was originated and conducted by Mr. Wilson for the benefit of the Vocal Music class. He then introduced the principal vocalists, viz., Miss Julia Bleadon, Mr. George Perren, Masters Cook and Naylor, Mr. Henshaw, Mr. Paul Jerrard, accompanist, and the conductor, Mr. Wilson. The concert commenced with Balfe's opera, "The Bohemian Girl" (by the kind permission of Mr. Bunn), and the several parts of *Count Arnheim*, *Thaddeus*, *Devilshoof*, and *Arline*, were ably sustained by Mr. Henshaw, Mr. Perren, Mr. Wilson, and Miss Bleadon respectively, who greatly pleased a large audience with their performance of the beautiful music of the opera. The second part consisted of miscellaneous music, including Sir H. Bishop's music in "Guy Mannerling." Some of the pieces in this opera, and also several of the songs in the "Bohemian Girl," were favoured with *encores*. Mr. Macaulay announced a lecture on the "Seasons of the Year," by Mrs. Balfour, on the 27th December, 1855; also, that by arrangements kindly made

by Mr. Crombie, the president of the Institution, Mr. Bunn will, on the 17th January, 1856, give his popular entertainment, entitled "A Visit from John to Jonathan," and expressed a hope on the part of the committee that the members and their friends would largely take advantage of these opportunities of hearing those celebrated lecturers. A vote of thanks to Mr. Wilson and his assistants concluded the proceedings of the evening.

POPULAR AND LIMEHOUSE.—On Tuesday, the 18th ult., Mr. J. Bennett, F.R.A.S., gave a lecture at the Literary Institution, "On the History and Construction of Clocks and Watches." It would be impossible that the somewhat dry subject of horology could be brought before a popular audience in a more simple or attractive manner. In his hands wheels, pinions, pendulums, escapements, and balances, assumed a charm which they never seemed to have before. His rapid glance at the history of chronometers could not fail to interest those who owe so much to maritime enterprise and success. His explanations of the mechanism of clocks and watches, especially the principle of compensation in the pendulum and balance-wheel, were clear and easily understood; and his graphic sketch of a visit to the watch-making district of Switzerland evinced close observation of men and manners, and not only amused his hearers, but must have awakened serious reflection with respect to the social state of our own working classes. On the whole, Mr. Bennett both pleased his audience, and sent them away with an intelligent idea of that little monitor which most men carry in their pockets, and continually consult, but of which generally they have as vague a notion as had the Highlander, who, having found a gold watch upon the field of battle, when after some hours it had run down, flung it away with contempt, exclaiming "She died last night." A watch, after listening to Mr. Bennett's lecture, no longer seems a complicated and inexplicable maze of wheels, but a very simple and beautiful piece of mechanism, upon which a marvellous amount of genius and application has been employed before it reached its present state of perfection.

To Correspondents.

BYE-LAWS OF INSTITUTIONS.—As the Committee of the Sheerness Mechanics' Institution are about revising the Bye-laws of that Society, they would feel obliged by any Institution in Union transmitting copies of such as may have been found to answer satisfactorily.

MEETINGS FOR THE ENSUING WEEK.

- MON.** London Inst., 7, Mr. C. C. Clarke, "On the Genius and Comedies of Molière."
Entomological, 8.
- TUES.** R. Inst., 3, Prof. Faraday, "On the Common Metals."
Syr-Egyptian, 7½, Rev. Dr. Hewlett "On the Sarcophagi of Egypt."
Civil Engineers, 8, Mr. R. K. Hall, "On the Causes of the Explosions in Steam Boilers."
Med. and Chirurg., 8½.
Zoological, 8.
- WED.** Literary Fund, 3.
London Institution, 3, Mr. Robert Grant, "On Elementary Astronomy."
Society of Arts, 8, *Extra-Ordinary*, Mr. J. K. Blackwell, "The Present Position of the Iron Industry of Great Britain, with reference to that of other Countries." Part II.
Graphic, 8.
Geological, 8, I. Mr. H. C. Sorby "On the Physical Geography of the Tertiary Estuary of the Isle of Wight;" II. Mr. E. W. Binney, "On the Permian Rocks of the South of Scotland."
Roy. Soc. Literature, 8½.
- THURS.** London Inst., 7, Mr. R. E. Grant, "On the Natural History of Extinct Animals."
Antiquaries, 8.
Royal, 8½.
- FRI.** Astronomical, 8.
Philological, 8.
- SAT.** London Inst., 3, Mr. T. A. Malone, "On the Elementary Principles of Animal and Vegetable Chemistry."
Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette December 21st, 1855.]

- Dated 17th December, 1855.*
2768. Henry Bessemer, Queen-street-place, New Cannon-street—Improvements in the manufacture of iron.
2770. Charles Edmund Green, 13, Blandford-street, Portman-square—Improvements in huts, tents and camp hospitals.
- Dated 5th December, 1855.*
2772. Joseph Hacking, Bury—Improvements in machinery for supplying fuel and air to furnaces.
2774. John Radeliffe and Thomas Vickers Favell, Rotherham—Improvements in machinery or apparatus for cutting sugar and other substances.
2776. Andrew Tevendale, 2, Wellington-buildings, Vauxhall-road, Liverpool—Improvements in propelling, and in the construction of, steam or other vessels.
2778. Andrew Maclure, 37, Walbrook—Improvements in lithographic printing-presses.
- Dated 10th December, 1855.*
2782. Thomas Heppleston, and John Hunter, Manchester—Improvements in machinery or apparatus for stretching and finishing yarns or threads.
2784. David Parsons, Pensnett, near Dudley—Improved brake for arresting or retarding at will the motion of locomotive and other engines and revolving machinery.
2786. Richard Archibald Brooman, 166, Fleet-street—Improvements in manufacturing gas from peat, and in treating hydrogen gas, in order to render it illuminating. (A communication.)
2788. Josiah George Jennings, Great Charlotte-street, Blackfriars-road—Improvements in connecting earthenware rain pipes and soil pipes of water-closets, and in valve water-closets.
- Dated 11th December, 1855.*
2790. Bernard Hughes, Rochester, New York, U.S.—A machine for making spokes and tool handles. (A communication.)
2794. Alexander Tolhausen, 7, Duke-street, Adelphi—Improvements in mariners' and land compasses. (A communication.)
2796. James Cliff, Burton-on-Trent—Improvements in or additions to furnaces.
2798. Reuben Levy, Manchester—Improvements in wearing apparel.
2800. René Simon Bouet and Henri Emile Isidore Doucin, Paris—Improvements in the preservation of meat and other animal substances serving for food.
2802. Alexandre Forot, Paris—Improvements in parasols.
2804. Rogers Ruding, 51, Bunhill-row—Improvement in printing silks and other woven fabrics with gold and other metal leaf or powder.
- Dated 12th December, 1855.*
2806. Martin Billing and Walter George Whitehead, Birmingham—Improved waterproof fabric or material.
2808. George Heron Hay and David Syme Hay, Edinburgh—Improvements in photographic pictures.
2810. William Leighton, Newcastle-upon-Tyne—Improvements in paddle-wheels.
2812. Thomas Rickett, Stony Stratford—Improvements in pressure gauges.
- Dated 13th December, 1855.*
2814. David Hart, Trinity-square—Improvements in signalling or communicating between parts of a railway train, and in the instruments and apparatus employed for such purpose.
2816. Alphonse Louis Poirerlin, Paris—Improved photographic engraving.
2818. George Skelton, Lambeth—Improved projectile.
2820. John Henry Johnson, 47, Lincoln's-inn-fields—Improvements in apparatus for containing and distributing aeriform fluids under pressure. (A communication.)
2822. George Hall Nicoll, Dundee—Improvements in fire-places or heating apparatus.
- INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.
2835. Ebenezer Rogers, Abercarn—Improvements in safety doors for mines.—15th December, 1855.
2880. Dundas Smith Porteous, Paisley—Regulating the pressure of gas, steam, water, or other fluids.—20th December, 1855.
- [From Gazette December 28th, 1855.]
Dated 9th November, 1855.
2520. John and William Olive, Woolfold, near Bury—Improvements in the manufacture of wheels for railway and other purposes.
- Dated 17th November, 1855.*
2596. Joseph Shaw, 22, New King-street, Hull—Improvements in the prevention of accidents arising from collisions on railways.
- Dated 23rd November, 1855.*
2643. John Henry Hutchinson, East Retford—Improved machinery for converting rectilinear motion into rotary motion.
2645. John Jobson, Litchurch, Derby—Improvements in the manufacture of railway chairs.
- Dated 24th November, 1855.*
2649. Jean Lobstein, Paris—Improvements in sewing machines.
2651. Robert Knowles, Chorlton-upon-Medlock—Improvements in winding on in certain machines for spinning cotton and other fibrous materials.
2653. Charles Sanderson, Sheffield—Improvement in the manufacture of iron.

Dated 26th November, 1855.

2655. Louis Joseph Frédéric Margueritte, Paris—Improvements in precipitating certain salts.
2657. John Wilkes, Birmingham—Improvements in the manufacture of tubes of copper and alloys of copper.
2659. François Coignet, 90, Rue Hauteville, Paris—Improvements in the use and preparation of plastic materials or compositions to be used as artificial stone, or as concrete or cement for building and other purposes.
2661. Frederick Osbourn, Aldersgate-street—Improved machinery for pressing, smoothing, or finishing garments or parts of garments.
2663. John Julius Clero de Clerville, Newman-street, Oxford-street—Improvements in preparing oil with other matters for painting. (A communication.)
2665. Robert Bell, 93, Glassford-street, Glasgow—Improvements in the manufacture of woven fabrics when made of wool and cotton, or of wool, cotton, and silk.

Dated 27th November, 1855.

2667. William Edward Newton, 66, Chancery-lane—Improvements in breech-loading fire-arms. (A communication.)
2669. Hiram Hyde, Truro, Nova Scotia—An improved manufacture of lubricating oil. (A communication.)
2671. Charles Rice, Massachusetts, U.S.—Improved method of manufacturing boots or shoes. (A communication.)
2673. Charles Rice, Massachusetts, U.S.—Improved process of preparing cloth so as to render it nearly, if not entirely impervious to water, but not so to air, such cloth being particularly useful in the manufacture of boots and shoes, or various other articles of dress or utility. (A communication.)
2675. George Louis Stott, St. George's, Gloucester—Improvements in the manufacture of carbonate of soda.
2677. John Henry Johnson, 47, Lincoln's-inn-fields—Improvements in windlasses, capstans, and other purchases, parts of which are applicable to the transmission of motive power. (A communication.)
2679. John Henry Johnson, 47, Lincoln's-inn-fields—Improvements in the manufacture or preparation of india rubber and gutta percha, and in the applications thereof. (A communication.)
2681. George Richardson, Craig's-court, Charing-cross—Improvements in chain cables and other chains. (A communication.)

Dated 14th December, 1855.

2824. William Philippi, 159, Regent-street—Improvements in coating iron with tin.
2826. George Tomlinson Bousfield, Sussex-place, Loughborough-road—Improvements in machinery for the manufacture of cut pile fabrics. (A communication.)
2828. Edward Orange Wildman Whitehouse, Brighton—Improvements in apparatus for measuring fluids.

Dated 15th December, 1855.

2830. William Henry Newman, 45, Cannon-street-road—Improved fire-lighter.
2832. Thomas Warren, Glasgow—Improvements in the manufacture and moulding or shaping of glass.
2834. Edward Brown Hutchinson, Moorgate-street—Improved apparatus for forming and cutting elliptical figures.
2840. Samuel Stewart, 28, Clements-lane—Improved combined engine and gas exhauster, and also improvements in the valves of such exhausters.
2842. Paul Marie Salomon, Rue Neuve, St. Eustache, Jacques Loir Montgazan, Rue de Boncy, and Charles Marie Joseph de Flers, Rue Lafitte, Paris—Improvements in the manufacture of gas from coals, and in the production of bituminous coke in that manufacture, and also in the apparatus connected therewith.

Dated 17th December, 1855.

2844. George Collier and John Crossley, Halifax, and James William Crossley, Brighouse—Improvements in apparatus employed in drying and stretching woven fabrics.
2846. Henry Stewart, Baker-street—A machine or apparatus for cleaning and polishing forks, spoons, and other like curved articles.
2848. Omrod Coffeen Evans, M.D., New York—Improvements in digging machinery.
2850. George Gotts Golding, Gray's-inn-road—Improvements in boilers for heating, warming, or raising steam.
2852. James Leitch, 1, Ellenborough-street, Liverpool—Improvements in filtering sugars and other saccharine matters.
2854. Jean Jacques Fontaine, Paris—Improvements in the manufacture of steel.
2856. Andrew Small, Glasgow—Improvements in marine compasses and in apparatus applicable thereto.

WEEKLY LIST OF PATENTS SEALED.

Sealed December 21st, 1855.

1423. Jacob Ben'jamin.
1441. Thomas Walker.

1443. William Pearce.
1445. Ignace Joseph Silbermann.
1457. James Ronald.
1459. Benoit Bonnet.
1471. Henry Walker.
1473. Charles Moreau-Darluc.
1483. Edward Joseph Hughes.
1484. Jean Baptiste de Lorenzi.
1491. Thomas Barling.
1510. Joshua Horton and Thomas Horton.
1518. Anguish Honour Augustus Durant.
1530. Richard Roberts and George Coppeck.
1549. Edmund Hart.
1586. Thomas Sadleir.
1628. Pietro Bertinetti.
1685. George Tomlinson Bousfield.
2079. William Frederick Thomas.
2117. John Henry Linsey.
2151. Henry Hughes.
2245. John Henry Johnson.
2253. James Murdoch.
2324. William Henry Walton.
2366. Alfred Gregory and John Jillings.
2394. Frederick Grace Calvert.

Sealed December 28th, 1855.

1479. John Skelley.
1485. Henri Dembinski.
1487. John Broadbent and Stanley Peter Youle.
1489. John Weems.
1493. John Birch.
1499. Robert Muckelt.
1509. Samuel Oddy.
1515. James Bullough, Robert Willan, and John Walmsley.
1520. James Beckett and William Seed.
1522. John Gedge.
1539. James Palmer.
1555. Charles Frederick Bielefeld.
1569. John Bethell.
1585. Francis Hamilton.
1598. Pierre Laroche.
1613. Charles Tovey.
1615. Thomas Trapp.
1629. David Fiske and Thomas Robert Hay Fiske.
1633. John Henry Johnson.
1634. John Henry Johnson.
1635. John Henry Johnson.
1642. John Henry Johnson.
1658. James Tildesley.
1729. William Fletcher Coles.
1734. Herbert Mackworth.
1827. Walter Brown.
1992. William Armand Gilbee.
2003. William Armand Gilbee.
2196. Richard Threlfall and William Knowles.
2199. William Edward Newton.
2205. John Dickinson.
2215. Henry Cornforth.
2358. William Teall.
2432. Alfred Vincent Newton.
2468. Fennell Allman.
2482. Peter McGregor.

Sealed January 1st, 1856.

1494. William Henry Tooth.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

December 17th.

1093. William Wilkinson.
1100. William Robertson.
1116. George Gwynne and George Fergusson Wilson.
1147. George Gwynne and George Fergusson Wilson.
1170. George Fergusson Wilson.
1171. George Gwynne and George Fergusson Wilson.

December 21st.

1149. Jean Louis David.
1202. James Ward and William Burman.

December 22nd.

9. Matthew Tomlinson.

December 24th.

1172. John Mason.
1174. William Beckett Johnson.
1197. Auguste Edouard Loradoux Bellford.

December 26th.

1185. Francis Alton Calvert.

December 27th.

1182. James Webster.
1183. Claude Joseph Edmée Junot.
1206. Robert Taylerson.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address.
3798	December 21.	Improved Vegetable Cutter.....	Page and Gurling.....	Melton, Suffolk.
3799	„ 31.	Fore Carriage for Perambulators	James Clifton	541, New Oxford-street.
3800	January ...1.	Chair	Thomas Pinfold Hawkins ..	Birmingham.